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**REMARKS**

This is intended as a full and complete response to the Office Action dated September 17, 2003. In view of the following discussion, the Applicant believes that all claims are in allowable form.

**CLAIM 12**

Claim 12 has been amended to replace the words "disassociation" and "disassociated" with "dissocaiton" and "dissocaited". The Applicant submits that the replacement of words was made to clarify claim language, and the scope of the claim remains the same.

**CLAIM REJECTIONS**

**A. 35 U.S.C. §102(e) Claims 12 and 18**

Claims 12 and 18 stand rejected as being anticipated by the United States Patent No. 6,136,211 issued October 24, 2000 to *Qian et al.* (hereinafter referred to as "*Qian*").

In the Office Action dated April 22, 2003 (paragraph 15), claim 12 had been identified as allowed. No new grounds for rejection of claim 12 have been found in the instant Office Action. The Applicants respectfully request clarification of the status of claim 12.

In paragraph 4 of the Office Action, the Examiner rejects claims 12 and 18 citing the teachings of *Qian* as disclosed in columns 4-13 and 1-20 and figures 1-7. The *Qian* patent comprises columns 1-20 and figures 1a-1d, 2-3, 4a-4b, 5a-5b, 6, and 7a-7b. Columns 1-3 contain a Background section and a smaller part of a Summary section. As such, the Examiner refers substantially to the entire *Qian* patent. The Applicants are unable to locate the specific teachings the Examiner refers to. The Applicants respectfully request to identify in a conventional manner, with reference to specific locations within the patent, the portion where the *Qian* patent contains the alleged teachings.

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Nonetheless, claims 12 and 18 recite limitations not taught, shown or suggested by *Qian*. *Qian* teaches a process for etching a substrate and simultaneously cleaning etch residue deposited on the surfaces of walls and components of the etch chamber. Process gas comprising etchant gas is used to etch a substrate in the etching chamber. Cleaning gas is added to the process gas to react with and remove substantially all the etch residue deposited by the process gas (Abstract).

However, *Qian* does not teach, show or suggest striking a plasma in the chamber to cause dissociation of the first etchant and the second etchant; and etching of the substrate, wherein the dissociated first etchant deposits material on the internal surfaces at a first rate and the dissociated second etchant deposits material on the internal surfaces at a second rate less than the first rate, and flowing oxygen into the chamber, as recited by claim 12.

Similarly, *Qian* does not teach, show or suggest striking a plasma of the chemical mixture to form one or more plasma constituents and depositing a film on the internal surfaces, wherein a first recombination rate of the one or more plasma constituents with the internal surfaces is substantially equal to a second recombination rate of the one or more plasma constituents with the film, as recited by claim 18.

"Anticipation requires the presence in a single prior art reference disclosure of each and every element of the claimed invention, arranged as in the claim." Lindemann Maschinenfabrik GmbH v. American Hoist & Derrick Co., 221 USPQ 481, 485 (Fed. Cir. 1984) (emphasis added). Therefore, the Applicants contend that claims 12 and 18 are patentable over *Qian* and, as such, fully satisfy the requirements of 35 U.S.C. §102 and are patentable thereunder. Accordingly, the Applicants respectfully request the rejection be withdrawn.

**B. 35 U.S.C. §103(a) Claim 21**

Claim 21 stands rejected as being unpatentable over by the United States patent No. 6,136,211 issued Oct. 24, 2000 to *Qian et al.* (hereinafter referred to as "*Qian*"). The Applicants respectfully disagree.

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Claim 21 recites limitations not taught, shown or suggested by *Qian*. *Qian* teaches etch processes that provide (col. 4, lines 11-29; col. 9, lines 42-60):

(a)  $\text{Cl}_2$ ,  $\text{N}_2$ , and  $\text{CF}_4$  at volumetric flow ratio  $\text{CF}_4:(\text{Cl}_2 + \text{N}_2)$  from about 1:20 to 1:1;

or

(b)  $\text{Cl}_2$ ,  $\text{N}_2$ , and  $\text{SF}_6$  at volumetric flow ratio  $\text{SF}_6:(\text{Cl}_2 + \text{N}_2)$  from about 1:20 to 1:1;

or

(c)  $\text{Cl}_2$ ,  $\text{N}_2$ , and  $\text{NF}_3$  at volumetric flow ratio  $\text{NF}_3:(\text{Cl}_2 + \text{N}_2)$  from about 1:20 to 1:1.

The Examiner's attention is directed to the fact that *Qian* does not teach, show, or suggest an etch process where an etchant gas comprises (i) a bromine-containing gas and (ii) a gas mixture of at least one of  $\text{SF}_6$  and  $\text{NF}_3$  each provided at a flow rate of less than about 20% of the flow rate of the gas mixture,  $\text{CF}_4$  and  $\text{O}_2$  provided at a flow ratio  $\text{CF}_4:\text{O}_2$  of about 4:1 and a flow rate of less than about 50% of the flow rate of the gas mixture, and chlorine-containing gas, as recited in claim 21.

More specifically, with regard to the subject matter of claim 21, *Qian* fails to teach the following limitations:

in the process (a): an etchant gas comprising a bromine-containing gas, a gas mixture of at least one of  $\text{SF}_6$  and  $\text{NF}_3$ , and ( $\text{CF}_4$  and  $\text{O}_2$ ), as well as specific flow ratios for component gases;

in the process (b): an etchant gas comprising a bromine-containing gas,  $\text{NF}_3$  or ( $\text{NF}_3$  and  $\text{SF}_6$ ), and ( $\text{CF}_4$  and  $\text{O}_2$ ), as well as specific flow ratios for component gases; and

in the process (c): an etchant gas comprising a bromine-containing gas,  $\text{SF}_6$  or ( $\text{NF}_3$  and  $\text{SF}_6$ ), and ( $\text{CF}_4$  and  $\text{O}_2$ ), as well as specific flow ratios for component gases.

The Examiner's attention is directed to the fact that *Qian* and claim 21 recite etch processes that use different gas compositions (i.e., *Qian* does not teach the use of Bromine containing gas). As known to those skilled in the art, an etchant gas composition is a single most important characteristic of an etch process. No routine experimentation or any other feasible experimentation with the *Qian* processes, including selection of the process parameters, can change the etchant gas composition of those processes to produce the Applicant's invention. As such, *Qian* teaches a different etch processes than what is recited by claim 21.

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Therefore, the Applicants submit that claim 21 is patentable over *Qian*. Accordingly, the Applicants respectfully request the rejection be withdrawn.

**Claim 13**

In discussion in paragraph 8, the Examiner has defined the status of claim 13 as "rejected". However, in the Disposition of Claims section of the Office Action Summary, such indication of the status of claim 13 is missing and no references supporting the rejection are provided in the instant Office Action. However, in light of the discussion of the patentability of claim 12, from which claim 12 depends, the Applicants submit that claim 13 is patentable over the references of record. Accordingly, the Applicants respectfully request the rejection be withdrawn.

**ALLOWED CLAIMS**

Applicants acknowledge and express appreciation for indication that claims 19-20 and 33-34 are allowed.

**Discussion in paragraph 8 of the Office Action**

The Examiner's attention is directed to the fact that, in Response to the Office Action dated April 22, 2003, no arguments regarding rejection of claim 12 was presented. On the contrary, the Applicants acknowledged and expressed appreciation for indication that claim 12 was allowed.

In reference to *Qian*, last paragraph of col. 8, *Qian* recites 29 gases and mixtures thereof as "suitable etchant gases" for substrate 25 comprising metal silicide layers 22 deposited over polysilicon layers 24 that are formed over silicon dioxide layers 26 and etched to form features 29 (col. 2, lines 39-42). However, *Qian* fails to teach specific gas compositions and flow rates, among other process parameters. In a plasma apparatus adapted for applying substrate bias power, as the apparatus of Figure 2, any gas may be used to accomplish some sort of etching of any material, for example, sputter etching. As such, plain reciting gases in the last paragraph of col. 8 by no means may be considered as an enabling embodiment or teaching of utility to those skilled in the art. Furthermore, due to a large number (29) of the recited gases and the

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even larger number of possible compositions ("and mixtures thereof"), routine experimentation is not a feasible solution to optimize a specific etch process. The sole guidance provided by *Qian* is that the etchant gases are to be selected to provide "high etch rates" and high selectivity" as to the particular materials being etched. On the contrary, claim 21 recites an embodiment that cannot be discovered by routine experiments from the teachings of *Qian*.

For a disclosure to be enabling without undue experimentation, a number of factors must be balanced. These factors include:

- Quantity of time and experimentation required (time and expense)
- Amount of direction or guidance provided in the reference
- Presence of working examples
- Nature of the application
- State of the prior art
- Skill of those in the art
- Predictability of the art, and
- Breath of the invention. *In re Wands*, 858 F. 2d 731, 8 USPQ 2d 1400, 1404 (Fed. Cir. 1988)

Here, the time requirement is large due to the large number of possible combination of gases, no direction of which gases or combination would yield acceptable results are given, no level of what is an acceptable result is defined and the examples of *Qian* do not teach the recited invention. Therefore, *Qian* does not teach or suggest the subject matter of claim 21.

### CONCLUSION

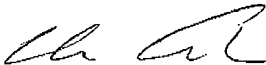
Thus, the Applicants submit that all claims now pending are in condition for allowance. Accordingly, both reconsideration of this application and its swift passage to issuance are earnestly solicited.

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If, however, the Examiner believes that any unresolved issues still exist, it is requested that the Examiner telephone Mr. Keith Taboada at (732) 530-9404 so that appropriate arrangements can be made for resolving such issues as expeditiously as possible.

Respectfully submitted,

Dec 17, 2003

  
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